



Telemedicine: Digital Challenges and Opportunities for Older Adults

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- Co-Director, Nebraska University Center for Biomedical Informatics Research and Innovation
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- Research focuses on health information technology and evaluating and improving human-computer interaction efficiency and effectiveness in the healthcare and public health domains.
- 120+ publications and a PI/Co-I on research projects totaling > \$8.55M.
- Fun fact: Kearney, Nebraska Native

Presentation Objectives

Telemedicine overview and relevant Health IT and Assistive Technology terminology.

Understand the preferences of aging adults desire to remain in place.

Survey assistive technologies and the opportunities they provide to enhance aging in place.

Discuss digital challenges to the adoption and usage of telehealth and assistive technologies.

Introduce SMART technologies to support aging adults to remain in place.

Relevant Terminology

Telehealth – The use of electronic information and telecommunications technologies to support long-distance clinical health care, patient and professional health-related education, public health and health administration.

Telemedicine – A broad term used to describe the delivery of health care at a distance, increasingly but not exclusively by means of the Internet.

Teleconsultation – The use of telemedicine techniques to support the interaction between two (or more) clinicians where one is providing advice to the other, typically about a specific patient's care.

EHealth – the integration of technology with medicine and healthcare

Relevant Terminology

Aging in place – the practice of aging in one's community, often in one's home

Independent living – an approach to living that emphasizes individual autonomy without compromising health and safety

Gerontechnology – a branch of technology focused on the needs of aging adults

Assistive technology – adaptive tools design to assist individuals with every-day tasks

Wearable technology – devices that are worn on the body and are often used to track biometric information or assistive features

Sensor - a device often found on wearable technologies that detects and measures biological processes and chemicals (ex. Continuous glucose monitor, Apple Watch, FitBit)

Relevant Terminology

Smart Devices - are all of the everyday objects made intelligent with advanced compute, including AI and machine learning, and networked to form the internet of things (IoT).

Internet of Things - describes physical objects that are embedded with sensors, processing ability, software, and other technologies, and that connect and exchange data with other devices and systems over the Internet or other communications networks

Smart Homes - a home equipped with lighting, heating, and electronic devices that can be controlled remotely by phone or computer.

Relevant Terminology

- Electronic **Health** Record – A repository of electronically maintained information about an individual's lifetime health status and health care, stored such that it can serve the multiple legitimate users of the record.
- Electronic **Medical** Record – The electronic record documenting a patient's care in a provider organization such as a hospital or a physician's office. Sometimes call an EHR
- **Personal** Health Record - is an electronic application through which patients can maintain and manage their health information (and that of others for whom they are authorized) in a private, secure, and confidential environment

Telehealth and Telemedicine

- Telehealth and telemedicine are two different types of online health care services.
 - Telemedicine refers specifically to online doctor visits.
 - Telehealth also includes health-related education services like diabetes management or nutrition courses and health-related training.

Technologies and Telehealth Service Modes

Technologies include videoconferencing, the internet, store- and-forward imaging, streaming media, and landline and wireless communications.

Telehealth services may be provided, for example, through audio, text messaging, or video communication technology, including videoconferencing software.

Telehealth Video Services

- Telehealth is a service that uses video calling and other technologies to help patients see their health care provider from home instead of at a medical facility.
- Telehealth may be particularly helpful for older adults with limited mobility and for those living in rural areas, as they will have the opportunity to see and talk with their doctor from their home.
- For older adults, talking with their doctor online, through a phone, tablet, or other electronic device, can often be easier, faster, and less expensive than making a trip to an office.

Telehealth Services

Telehealth can also help support family caregivers who are taking care of their loved ones either close by or from afar. If a caregiver needs to ask the doctor a question, they can do so through an online health portal rather than waiting for and traveling to an in-person appointment.

Are Telehealth Appointments Covered by Insurance?

Many insurance providers, including Medicaid and some private insurers, are beginning to cover telehealth services. However, telehealth coverage varies widely from state to state with differences in how telehealth is defined and paid for.

Because insurance coverage policies differ, it's important to check with insurance providers or your health care provider's billing department directly for the latest information about coverage for telehealth services.

NIH initiative tests in-home technology to help older adults age in place

Many older adults want to live at home independently as they age. Sometimes all they need is a little help from their family and friends—and the right technology. A 2016 initiative led by the [National Institutes of Health \(NIH\)](#) aimed to help seniors age in place by developing a research platform to study the use of health-related in-home sensors and other technologies.

CART—Collaborative Aging (in Place) Research Using Technology—unites NIH, academic, and industry experts to develop and test unobtrusive tools that record and track real-time changes in older adults' health status and activities. Launched in October 2016, the \$7 million, 4-year project planned to take place in more than 200 homes in rural and urban communities across the United States.

NIH initiative tests in-home technology to help older adults age in place

"This project aimed to provide a systematic way of investigating technology that may enable older people to remain independent and avoid hospitalizations and transitions into care facilities," said Nina Silverberg, Ph.D., of the [National Institute on Aging \(NIA\)](#), which leads the project.

The study investigated if existing and other devices now being developed can identify health issues and other problems—such as depression, risks for falls, or leaving the stove on—that may lead to a loss of independence.

Only 5-15% of the people who require Prostheses & Orthoses or Assistive Health Technology (AHT) devices – actually get them. (WHO)

In 2050, it is anticipated that there will be 2B people in need of assistive devices with only 1 in 20 having access to them.

Better health for people with disabilities



Over **1 BILLION** people globally experience disability



1 in 7 people

People with disabilities have the same health care needs as others

But they are:

2x

more likely to find inadequate health care providers' skills and facilities

3x

more likely to be denied health care

4x

more likely to be treated badly in the health care system



1/2

of people with disabilities cannot afford health care

They are:

50%

more likely to suffer catastrophic health expenditure



These out-of-pocket health care payments can push a family into poverty

Rehabilitation and assistive devices can enable people with disabilities to be independent



70 MIL

people need a wheelchair. Only 5-15% have access to one.



360 MIL

people globally have moderate to profound hearing loss.

Production of hearing aids only meets:

10% of global need

3% of developing countries' needs

Making all health care services accessible to people with disabilities is achievable and will reduce unacceptable health disparities



remove physical barriers to health facilities, information and equipment



make health care affordable



train all health care workers in disability issues including rights



invest in specific services such as rehabilitation

Source: World report on disability: www.who.int/disabilities/world_report

Assistive Technology

- Assistive technology refers to assistive, adaptive, or rehabilitative devices often used by individuals with disabilities or older persons
- Some common assistive devices include
 - Mobility aids - canes, walkers, wheelchairs
 - Voice recognition and closed-captioning programs to help individuals with sensory impairments use computers or mobile devices
 - Modifications to the home environment including ramps and grab bars
 - Adaptive tools and utensils for individuals with limited fine-motor skills or dexterity

Preferences of Aging Adults

- 89% of participants 75+ would like to remain in their local community
- 88% of participants 65-74 would like to remain in their local community

Percent of respondents who ...	Adults 50 and Older	50 to 64	65 to 74	75 and Older
...define their "community" as a place, town, city, or community area	55%	55%	54%	58%
...would like to be living in the same local community five years from now	83	79	88	89
...had a conversation with any neighbor in the past three months	85	84	87	84
...know 6 to 9 neighbors on a first-name basis	15	15	17	15
...know 10 or more neighbors	48	47	47	53
...would like to be more involved in their local community	17	17	19	13
...feel something in common with people in the local community*	64	65	67	56
Average score on index based on 7 items above	4.4	4.3	4.5	4.4

N=1005
Source: AARP/Roper Public Affairs & Media group of NOP World, Beyond 50.05 Survey, 2004
*Percent who answered "Doesn't sound at all like me" in response to the statement:
"I feel little or nothing in common with the people in my local community."

Assistive Technology Products

- More recently, advances in mobile technology and sensor systems has created new types of assistive technology products
- These include devices like
 - Wearable trackers such as Fitbit, Apple Watch, and Garmin
 - Digital Health tools such as telemedicine, eHealth communication tools between patients and care teams,
 - Ambient sensors and Digital Assistant can detect environmental conditions for safety and convenience

Wearable Devices





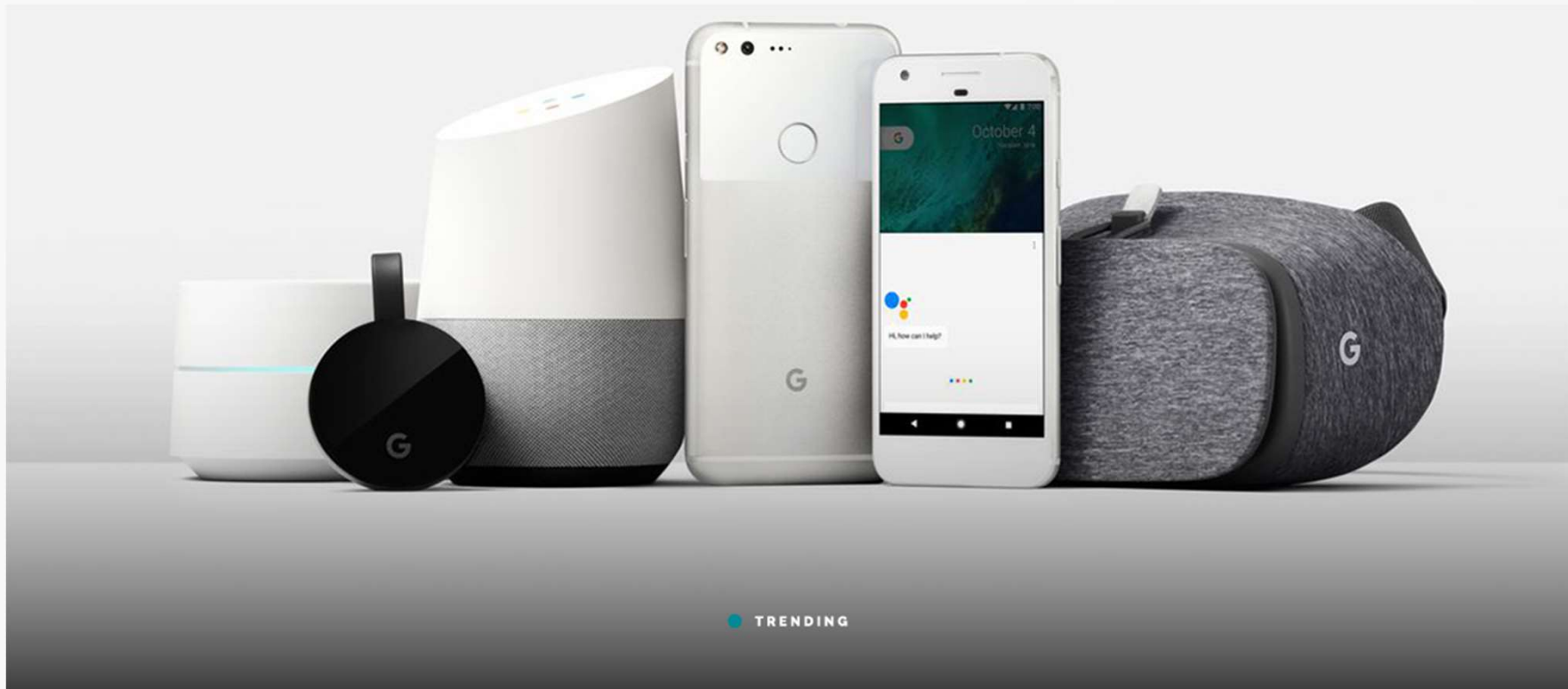
DEPARTMENT NAME

Smart Homes and Ambient Sensors

Sensor	Type	Characteristics	Cost (\$)
Magnetic switch	Ambient	The binary-status-providing sensors are easily installable. They are mainly used to detect the opening of doors, windows, etc.	5 ± 0.75
Temperature sensor	Ambient	The continuous-data-providing sensors detect the temperature of the ambient environment.	9 ± 2
Photosensor	Ambient	The sensors detect illuminance and provide continuous data.	5 ± 1.25
Pressure pad sensor	Ambient	The sensors provide continuous pressure measurement at any surface.	25 ± 5
Water flow sensor	Ambient	The sensors continuously measure the flow of water in taps or showers.	24 ± 3
Infrared motion sensor	Ambient	The binary-status-providing sensors detect motion in the coverage area.	35 ± 2
Force sensor	Ambient	Detects movement and falls	33 ± 5
Smoke sensor	Ambient	The binary-status-providing sensors detect smoke in the environment.	18 ± 6
Biosensor	Wearable	The sensors monitor vital signs and require professional adjustment. They are difficult to install.	180.00 ± 5.00



Communication Tools and Platforms



Transforming Wellness and Aging through Business, Informatics and Gerontology

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Nebraska Aging Adults Needs and Opportunities for Assistive Technologies

Variable (N=114)	Mean/%
Education	
<High School	0.0
High School or GED	2.6
Some/2year College/Trade	13.3
4-Year Degree	39.5
Graduate/Post Grad	32.5
Employment	
Employed	23.7
Unemployed	3.5
Retired	72.8
Income (N=98)	
<\$20,000	7.1
\$20,000 - \$34,999	13.3
\$35,000 - 49,999	16.3
\$50,000 - 74,999	26.5
\$75,000 - 99,999	16.3
>\$100,000	20.4
Marital Status (N=112)	
Single	6.2
Married	59.8
Widowed	16.1
Divorced	17.9
Separated	0.0

**Proportion of
participants who
use smartphone,
computer, laptop, or
tablet for listed
purpose.**

Technology	% Yes
Internet	99.1
Smartphone	90.4
Computer/Laptop	87.7
Tablet	71.1
Telehealth Technology (e.g. OneChart)	68.4
Smart TV Technology	55.3
Smart Speaker Technology	44.7
Grocery Services (e.g. delivery)	27.2
Transportation Services (e.g. Uber)	22.8
Lodging Services (e.g. AirBnB)	20.2
Smart Home Technology (e.g. Ring)	18.4
Note: “Use” assessed as binary Yes/No	

**Proportion of
participants
who use
technology
focused AITs**

Technology Purpose	% Yes
Email	99.1
Internet	97.4
Texting	92.1
Directions/Navigation	91.2
Pictures	90.4
Telephone Calls	86.8
Social Media	81.6
Books	72.8
Video Calls	71.1
Videos/Music	63.2
Managing Schedules	57.9
Games	57.9
Do Not Use for Above Purposes	11.4
Note: “Use” assessed as binary Yes/No	

Smart Security

Smart Security Systems	SimpliSafe	\$39.99 – \$599.99 \$4.99 - \$49.99/month
Video Doorbells	Ring Doorbell	\$100.00 - \$300.00
Smart Door Lock		
Cameras	ADT Indoor Security Camera	\$30.00 - \$249.99
Smart garage door opener	Chamberlain Smart Door Opener	\$30.00 - \$200.00

Smart Care

Voice-Activated Virtual Assistants	Google Assistant, Amazon Alexa, facebook	\$29.99 – \$300.00
Cameras	ADT Indoor Security Camera	\$30.00 - \$249.99
bed ladder assist		
Mobile Phones and Touchscreen Tablets	Apple Products, Grandpad	\$1000-\$1500
Caregiver call button	Home Guardian Caregiver Call Button System by Medical Guardian™	

Smart Home

Other smart appliances

Smart Stoves

Whirlpool Stove

\$1,199.99

Smart Lights

Philips Hue

\$150.00 - \$200.00

Cameras

ADT Indoor Security Camera

\$30.00 - \$249.99

Smart garage door opener

Chamberlain Smart Door Opener

\$30.00 - \$200.00

Smart thermostat

Google Nest

\$80.00 - \$300.00

telephone for deaf individuals

Lifeware device for steadying the hand while eating

Smart Health

Smart Pill Dispenser/Medication Reminders	MedMinder	\$49.99/month
Heart Rate Sensors	Polar	
Blood Pressure Sensors	Polar	
Smart watch	Fitbit	
Therapeutic Robot	PARO	
Glucose monitor		

Practical Limitations of Adoption and Usage of Assistive Technologies



Security



Cost



Internet access/bandwidth



Individuals not knowledgeable with how certain technologies work may be more vulnerable to cybercriminals



Limitations and Challenges when using Assistive Technologies

- Privacy and Security
- Transparency and Informed Consent
- Data Ownership
- Liability
- Data misinterpretation

Barriers to Use (Nebraska)

- Limited access to high-speed internet
 - According to a 2021 survey¹ conducted by the AARP, One-third of voters 50+ say high speed internet access is a problem in their community
 - The same survey found that only 11% of rural homes had high-speed internet



University of Nebraska – Omaha - Resources



Transforming Wellness and Health
through Business, Informatics and
Technology – UNO Initiative



Nebraska University Center for
Biomedical Informatics Research
and Innovation



UNO Health Informatics Research
Lab

Thank you!

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